



# NUTRITIONAL STATUS OF RURAL CHILDREN AGED SIX MONTHS TO FIVE YEARS IN RURAL AREAS NEARBY SURENDRANAGAR OF GUJARAT

**ABSTRACT: BACKGROUND AND OBJECTIVES:** Under nutrition continues to be a primary cause of ill-health among children in developing countries. The objective was to study Nutritional status of rural children between ages 6 months to 5 years. **SETTING AND DESIGN:** Our study area was villages of rural areas nearby Surendranagar District of Gujarat where 250 children were randomly selected aged between 6 months- 5years. **METHODS AND STATISTICAL ANALYSIS:** Data was collected by interview, physical examination and then statistically analyzed. **RESULTS:** The prevalence of moderate stunting and moderate wasting was 52.8% and 47.2%, severe stunting and wasting was in 15.2% and 19.6% children respectively. There was no significant age wise or sex wise difference statistically in prevalence of under nutrition. **INTERPRETATION & CONCLUSION:** There is significant number of undernourished children in the study area. Nutrition education and regular growth monitoring are required in long term for combating the same.

**KEYWORDS:** under nutrition, wasting, and nutritional status.

**INTRODUCTION:** Under nutrition continues to be a primary cause of ill-health and premature mortality among children in developing countries. In the public imagination, the home of the malnourished child is sub-Saharan Africa. But in reality just over 30% of Africa's children are underweight and the same for South Asia is over 50%. And in Bangladesh and India, the proportion of undernourished children is very significantly higher.

In NFHS-3 it has been estimated that in India, 65% i.e. nearly 80 million children under five year of age suffer from varying degree of under nutrition, 46% are moderately to severely underweight (thin for age), 38% are moderately to severely stunted (short for age), and approximately 19% are moderately to severely wasted (thin for height).

India ranked 96 out of 119 countries in the global hunger index (GHI) developed by the international food policy and research institute (IFPRI) in 2006, and where child under nutrition is concerned, it stood 117 among 119 countries. In view of this, our investigation assessed the nutritional status of rural children of Rural areas nearby Surendranagar district Age between 6 months to 5 years.

**MATERIAL METHODS:** This was an observational and study Sample size of 250 children was decided after considering the prevalence of malnutrition in India in NFHS-3. Study areas were - Lakhtar, Vana, Limbdi, Tavi, Dedadara, Kothariya, Bhadvana villages in rural areas nearby Surendranagar district in Gujarat. Here majority of population belonged to the lower socio-economic status, having both literates and illiterates and the chief language spoken was Gujarati.

The majority of population was Hindus. All children (male & female) b/w age 6 month to 5 years were included and children with cerebral palsy, congenital malformations, HIV (if screened previously) or with chronic morbidity were excluded. Approval of ethics committee of university was

Also taken. Visits were done in nearby rural areas on routine working days. Informed consent was obtained from parents. The data was collected by interviewing the parents or guardian using a pre- designed Performa.

A meticulous enquiry was done on dietary habits and the daily dietary intake of each child was calculated by last 24 hours recall basis method. Anthropometric, general and systemic examination of children b/w age 6 month-5yrs was done for Vitamin A deficiency, other micronutrients deficiency, Immunization status, Anemia.

Anthropometric measurements: Age of the child is taken from records of anganwadi workers which is verified from birth certificate of that child. Height and Weight measurements were taken by the observer following the standard techniques.

These were recorded with the child wearing minimal clothing, up to the nearest 1mm and 500gm respectively. Technical errors of measurement were calculated and they were kept within reference values.

WHO growth charts and classification (2006) was used to interpret the anthropometric data. Collected data was categorized and analyzed to get final result. Z test (normal distribution study analysis) was used for statistical analysis.

#### OBSERVATIONS:

SL. No.	AGE	MALE (NO.)	FEMALE (NO.)	TOTAL (NO.)
1.	6 mth-1yr	8(64.2%)	6(35.7%)	14(5%)
2.	1yr-3yr	68(43.2%)	78(56.8%)	146(58.4%)
3.	3yr-5yr	52(57.7%)	38(42.2%)	90(36%)
<b>TOTAL</b>		<b>128(51.2%)</b>	<b>122(48.8%)</b>	<b>250(100%)</b>

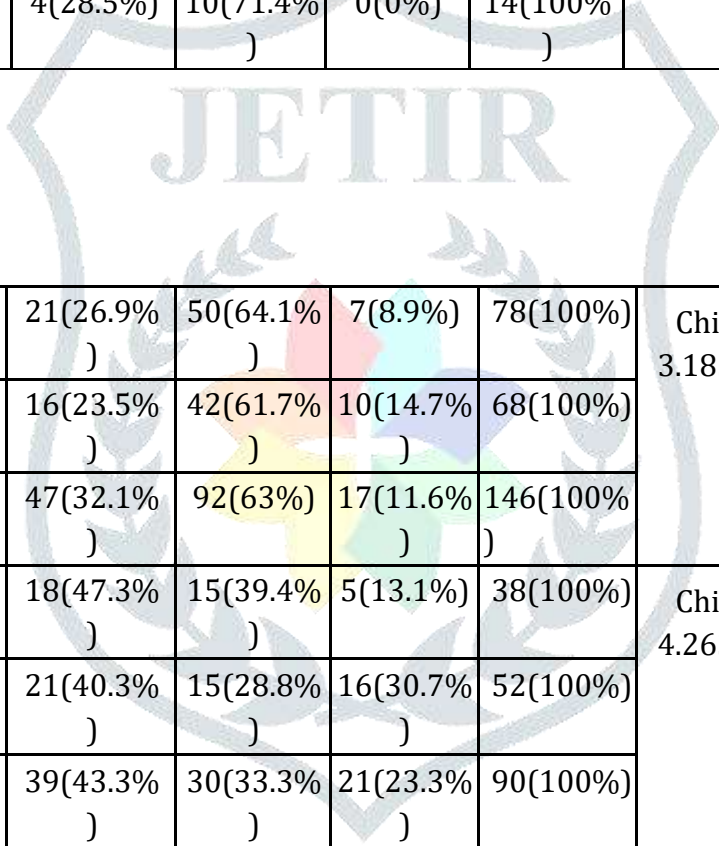
Table 1: Distribution of children according to Age and Sex (n=250)

INDICES	NORMAL	MODERATELY UNDERNOURISHED	SEVERELY UNDERNOURISHED
	No. (%)	No. (%)	No. (%)
HT FOR AGE	80 (32%)	132 (52.8%)	38 (15.2%)
WT FOR HT	83 (33.2%)	118 (47.2%)	49 (19.6%)

EDEMA	250 (100%)	0 (0%)	0 (0%)
<b>TOTAL</b>	<b>15 (6%)</b>	<b>154 (61.6%)</b>	<b>81 (32.4%)</b>

**Table 2A : Distribution of Children according to W.H.O Classification**

Age	Sex	Ht for Age			Total	Chi-squar etest
		Normal	Moderat e (-2to-3SD)	Sever (<-3SD)		
6m-1yr	F	0(0%)	6(100%)	0(0%)	6(100%)	Not Applicable
	M	4(50%)	4(50%)	0(0%)	8(100%)	
	Total	4(28.5%)	10(71.4%)	0(0%)	14(100%)	



1yr-3yrs	F	21(26.9%) )	50(64.1%) )	7(8.9%) )	78(100%)	Chi-square value = 3.185 p-value = 0.203 NS
	M	16(23.5%) )	42(61.7%) )	10(14.7%) )	68(100%)	
	Total	47(32.1%) )	92(63%) )	17(11.6%) )	146(100%) )	
3yrs-5yrs	F	18(47.3%) )	15(39.4%) )	5(13.1%) )	38(100%)	Chi-square value = 4.263 p-value = 0.119 NS
	M	21(40.3%) )	15(28.8%) )	16(30.7%) )	52(100%)	
	Total	39(43.3%) )	30(33.3%) )	21(23.3%) )	90(100%)	

**Table 2B: Height for age**

Age	Sex	Wt for Ht			Total	Chi-square test
		Normal	Moderate (-2to-3SD)	Sever (<-3SD)		
6m-1yr	F	1(16.7%)	1(16.7%)	4(66.7%)	6(100%)	Chi-square value = 7.778p-value = 0.02 S
	M	6(75%)	2(25%)	0(0%)	8(100%)	
	Total	7(50%)	3(21.4%)	4(28.6%)	14(100%)	
1yr-3yrs	F	21(26.9%)	35(44.9%)	22(28.2%)	78(100%)	Chi-square value = 0.829p-value = 0.661 NS
	M	23(33.8%)	28(41.2%)	17(25%)	68(100%)	
	Total	44(30.1%)	63(43.2%)	39(26.7%)	146(100%)	
3yrs-5yrs	F	11(28.9%)	24(63.2%)	3(7.9%)	38(100%)	Chi-square value = 1.286p-value = 0.526 NS
	M	21(40.4%)	28(53.8%)	3(5.8%)	52(100%)	
	Total	32(35.6%)	52(57.8%)	6(6.7%)	90(100%)	

Table 2C: Weight for Height

LITERACY STATUS	NO. OF MOTHERS	NO. OF CHILDREN OBSERVED	HT FOR AGE<-2SD (moderate & severestunting)	WT FOR HT<-2SD (moderate & severewasting)
ILLETERATE	55(100%)	55(100%)	48(87.2%)	44(80%)
PRIMARY	105(100%)	105(100%)	78(74.2%)	71(67.6%)
MIDDLE-HS	79(31.6%)	79(31.6%)	40(50.6%)	46(58.2%)
DEGREE	11(4.4%)	11(4.4%)	4(36.3%)	6(54.5%)
<b>TOTAL</b>	<b>250(100%)</b>	<b>250(100%)</b>	<b>170(68%)</b>	<b>167(66.8%)</b>
Chi-square value (p-value)			7.427(0.059) NS	7.715 (0.052) NS

Table 3: Distribution and Nutritional status of children according to literacy status of mother: (n=250)

SE Class	CHILDREN OBSERVED	HT FOR AGE <-2SD (moderate & severestunting)	WT FOR HT<-2SD (moderate & severe wasting)
I	5(100%)	5(100%)	4(80%)
II	9(100%)	8(88.9%)	7(77.7%)
III	71(100%)	50(70.4%)	50(70.45%)
IV	157(100%)	103(65.6%)	104(66.2%)
V	8(100%)	4(50%)	2(25%)
<b>TOTAL</b>	<b>250(100%)</b>	<b>170(68%)</b>	<b>167(66.8%)</b>
Chi-square value (p-value)		5.759 (0.218) NS	14.267 (0.006) S

Table 4: Distribution of Children according to Socio-Economic status: (n=250)

Birth Intervl	CHILDREN OBSERVED	HT FOR AGE <-2SD (moderate & severestunting)	WT FOR HT<-2SD (moderate & severewasting)
<24 months	30(100%)	23(76.6%)	27(90%)
24-35 months	52(100%)	37(71.1%)	40(76.9%)
>35 months	76(100%)	35(46%)	37(48.7%)
<b>TOTAL</b>	<b>158(100%)</b>	<b>95(60.1%)</b>	<b>104(65.8%)</b>
		6.597 (0.037) S	20.566 (0.000) S

Table 5: Distribution and Nutritional status of children according to Birth interval: (n=158) birth order 1 is excluded



Exclusiv eBF	CHILDRE N OBSERVE D	HT FOR AGE <- 2SD (moderate & severe stunting)	WT FOR HT<-2SD (moderate & severewasting)
Given	227(100%)	150(66%)	153(67.4%)
Not Given	23(100%)	20(86.9%)	14(60.9%)
<b>TOTAL</b>	<b>250(100%)</b>	<b>170(68%)</b>	<b>167(66.8)</b>
		0.143 (0.705) NS	0.402 (0.526) NS

Table 6: Nutritional status of children according to Exclusive Breast Feeding

IMMUNIZATIO N STATUS (UIP)	CHILDREN OBSERVED NO. %		STUNTE D NO. %		WASTED NO. %	
COMPLETE	229	91.6	42	18.3	152	66.3
PARTIAL	18	7.2	6	33.3	12	66.6
NOT TAKEN ANY	3	1.2	2	66.6	3	100
<b>TOTAL</b>	<b>250</b>	<b>100</b>	<b>50</b>	<b>20</b>	<b>167</b>	<b>66.8</b>

Table 7: Nutritional status of children according to immunization status

MICRONUTRIENT	NO. OF CHILDREN WITH DEFICIENCY	% OF CHILDREN WITH DEFICIENCY
VIT- A DEFICIENCY	11	4.4
ANEMIA	155	62%
VIT-B-COMPLEX DEFICIENCY	12	4.8
VIT-D DEFICIENCY	13	5.2

Table 8: Prevalence of micronutrient deficiency

**RESULTS:** In the present study the prevalence of stunting and severe stunting was found to be 52.8% and 15.2% respectively. The prevalence of wasting was 47.2% and of severe wasting was 19.6%. It was observed that malnutrition was higher in female children. All forms of under nutrition namely underweight, stunting, and wasting was influenced by mother's education status; with increased prevalence of all forms of under nutrition among children of illiterate mothers, children of lower socio-economic status ( $p < 0.05$  in all cases), with birth interval less than 24 months and unimmunized children. In our study anemia was the most common of micronutrient deficiency with its presence in 155(62%) children followed by Vitamin B complex deficiency which was detected in 12(4.8%) of children.

**DISCUSSION:** In our study, 250 children were studied, of them 128(51.2%) were male children and 122(48.8%) were female children. According to the WHO recommended classification the prevalence of moderate stunting (low height for age) and wasting (low weight for height) was 132(52.8%), 83 (33.2%) respectively in our study. Severe degree of stunting and wasting observed were 38 (15.2%) and 49(19.6%) respectively.

No children were observed with edema, overweight or obesity in the present study. According to NFHS 1998-99 the total prevalence of stunting and wasting in Gujarat is found to be 43.5% and 16.2%. According to NNMB report 2006 the overall prevalence of stunting (Height for age <Median -2SD) was observed to be 45%, while that of severe stunting (Height for age <Median -3SD) was 20%. The overall prevalence of wasting (Weight for Height <Median -2SD) was observed to be 20%, while that of severe wasting (Weight for Height <Median -3SD) was 7%.

In the present study stunting, and wasting were influenced by mother's education status ( $p=0.05$ ) with increased prevalence of all forms of under nutrition among children of illiterate mothers. According to NFHS III data in illiterate mothers 57.2% children were stunted and 22.7% were wasted when compared with 21.9% stunted and 12.8% wasted of mothers with >12 years education. According to a study done in Patiala, Mother's education seemed to play a protective role against children under nutrition.

Overall 70.75% of the mothers were literate though up to different levels. Prevalence of under nutrition was the highest where mothers were illiterate (60.9%) vs. value of 21.2% where mother was educated more than high school; stunting was 65.25% where mother was illiterate and 31.3% where education level of mother was more than high school.

In the present study children of higher socio-economic status were less undernourished than children of lower socio-economic status ( $p 0.006$  in wasting). According to NFHS III, the prevalence of stunting was 44% in children of low standard of living index and 18.3% in high standard of living respectively. The prevalence of wasting was 10.1% and 25.0% among children of high and low standard of living index families.

This study was done in children <3 years only. In another study conducted in Uttar Pradesh the prevalence of underweight was maximum at 75% among children of low socio-economic status while only 24% among children of high socio-economic status ( $=5.66^2$ ,  $DF=2$ ,  $p<0.02$ ). According to a study done in Dharwad, Karnataka 2007, most of the children with stunted (58.33%) and wasted (45.94 %) nutritional status belonged to low SES category followed by 38.88 and 35.13 percent of the children belonged to medium SES and only 2.77 and 18.91 percent belonged to high SES category respectively.

Among the children with normal nutritional status 48.27 percent belonged to high socio economic status followed by 31.03 percent fell in medium and only 20.68 per cent in low SES category respectively. In this study, the prevalence of stunting and wasting were maximum among children with birth interval of less than 24 months and was found to be 76.6% and 90% respectively. In the study done at Calcutta, West Bengal it was observed that prevalence of underweight was 68.7% among children of birth interval less than 36 months, while it was significantly less ( $p<0.05$ ) in children with birth interval of more than 36 months.

This can be associated with other risk factors such as mothers' inadequate capacity for caring for her children. According to NFHS III 55.6% children are stunted and 18% children are stunted who have birth spacing of <24 months.

It was good to note that 227 (90.8%) children were given exclusive breast-feeding

in our study. In a study done in Rajkot Prevalence of exclusive breastfeeding reported at 3 months was 97% which declined to 62% by 6 months of age of infants. In NFHS III Only 69 percent of children less than two months of age are exclusively breastfed. Exclusive breastfeeding drops to 51percent at 2-3 months of age and 28 percent at 4-5 months of age.

In our study the prevalence of stunting and wasting were high in children who were not given exclusive breast-feeding and were found to be 86.9% and 60.9% respectively. In the study done in tribal area of Madhya Pradesh the authors have observed lack of exclusive breast-feeding as a contributory factor to under nutrition.

With regards to immunization, 229(91.6%) children completed the primary immunization. While 18(7.2%) were partially immunized, and 3 (1.2%) did not receive any immunization. Our findings were similar to the results observed in a Multi-centric study in Karnataka, in which 91.3% of children were fully immunized, 7.4% were partially immunized and 1.3% children did not receive Any vaccine. In Gujarat None immunization rate have consistently declined from 19% to 5% between NFHS I to NFHS III. Full immunization coverage rate in NFHS III is 45% which is similar to national average. According to Multi indicator cluster survey (2007) the rate of non-immunized children has gone down to 2% and that of fully immunized children have reached to 82%. All vaccine coverage is 90% or more in Gujarat. It was observed in our study that children who had completed their primary immunization were less prone for under nutrition. The prevalence in this category was stunting-18.3% and wasting-66.3%.

In children who had not completed their primary immunization the prevalence of underweight was stunting was 33.3% and wasting was 66.6%. In each condition p was <0.05. In a study done in Calcutta, West Bengal a significantly higher (p<0.05) prevalence of malnutrition was observed among partially immunized and non-immunized children (81.25% and 88.23% respectively) in comparison to fully immunized children (62.07%).

In our study anemia was the most common of micronutrient deficiency with its presence in 155(62%) children. Vitamin 'A' deficiency was detected in 11(4.4%) of children. Vitamin 'B' complex deficiency was in 4.8% and vitamin D deficiency in 5.2% of children. In a study conducted in Orissa, it was revealed that 5.8% of children studied had vitamin B complex deficiency mainly in the form of angular stomatitis. Vitamin A deficiency in the form of Bigots spots was seen in 1.3%. In another study done in Uttar Pradesh it was observed that vitamin A deficiency was present in 17.89% of children, Vitamin B complex deficiency was observed in 11.58% children. In a study conducted in Ghaziabad, anemia was present in 14.7%, Exophthalmia in 1.6% and Goiter in 0.6% children.

**CONCLUSION:** The mean height and weight of the children were lesser than the NCHS reference data but better than some studies conducted in other parts of India. Mother's literacy had a much higher impact on better nutritional status of children. Lower socio-economic condition, lower birth interval, faulty feeding habits and partial immunization were found to have adverse effect on nutritional status of children. No doubt the nutritional status of children is improving with decrease in prevalence of under nutrition but still a lot needs to be done.

**LIMITATIONS:** Hemoglobin estimation was not done so severity of anemia could not be found out. Dietary intake was assessed by 24-hour recall basis method and application of better and elaborate methods of dietary intake assessment was beyond the scope of the study.



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